

LBNL Lessons Learned Statement

¹³³Ba Skin Contamination

June 29, 2001

Background

While preparing to install a newly purchased ¹³³Ba sealed source in a magnetic spectrometer at the 88-inch Cyclotron, a researcher noticed an imperfection on the surface of the source and used a moistened Q-tip to swipe the surface. After cleaning the source, the researcher monitored the Q-tip with a Ludlum 3 pancake detector and found that it was contaminated. He then monitored his hands and found contamination on the index finger of his left hand.

The experimenter quickly decontaminated his finger and then requested assistance. Radiation protection personnel arrived and performed a thorough survey of the individual and surrounding work area. Further decontamination of the experimenter's finger and the surrounding workspace was performed.

After investigation and analysis, Cyclotron management received notice of 533,000 dpm beta gamma total personnel (hand) contamination from the ¹³³Ba source (ORPS threshold: 25,000 dpm). No other personnel contamination was found.

Analysis

The data sheet from the manufacturer describes the ¹³³Ba sealed source as consisting of an evaporated barium salt deposited on 0.9 mg/cm² aluminized Mylar backing with a 100 microgram/cm² acrylic cover. As noted on the manufacturer's specifications, this type of source is quite fragile and must be handled very carefully. Upon receipt of the source at LBNL, the RCT performed the initial check-in and swipe test and found no loose contamination. The RCT then delivered the source to the authorized research project.

While preparing to use the source, the experimenter noticed an imperfection on the front face of the source and used a moistened Q-Tip to attempt cleaning it. This apparently caused the thin acrylic cover to fail and the barium salt to dissolve. The Q-tip absorbed most of the radioactive contamination, but some was spread to the researcher's finger.

It was determined that the direct cause of the accident was personnel error. The experimenter damaged the source by applying sufficient force to damage the fragile surface.

The root cause was identified as a training deficiency. The sealed source training course did not specifically require the use of gloves when swiping or directly manipulating a fragile sealed source. This requirement has now been included in the training course and will be addressed during the sealed source authorization renewal training.

Corrective Actions

- All members of the experimental group, including the principal investigator, reviewed the accident and the proper procedure for handling sealed sources with fragile coverings.
- The training materials for course EH&S 432, "Radiation Safety in the Laboratory", have been updated to include requirements for wearing gloves while handling fragile sealed sources or when cleaning or wipe testing sealed sources.

Further Information

Any questions regarding this event or the information presented in this lessons learned statement may be directed to Jim Case (x7352) or Bob Fairchild (x2278).